REMARKS

In response to the Final Office Action mailed September 16, 2002, and the Request For Continued Examination (RCE) submitted herewith, Applicants respectfully request reconsideration.

Claims 1-49 are pending in this application. Claims 1-9 and 11-22 have been amended and claims 23-49 are newly presented. Previously independent claims 11 and 22 have been rewritten to depend from independent claim 1.

Attached hereto are marked-up versions of the changes made to the claims by the current amendment. The attached pages are captioned **"MARKED-UP CLAIMS."**

Claims 1-3, 10, 12-14, and 22 stand finally rejected under 35 U.S.C. §102(e) as being anticipated by Rao (U.S. Patent No. 5,920,733), or in the alternative, obvious under 35 U.S.C. §103(a) in view of Rao. Claims 4-9, 11, and 15-21 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over Rao in view of U.S. Patent No. 6,145,028 to Shank (hereinafter Shank). Claims 7 and 18 also stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Rao and Shank in view of US Patent No. 5,974,544 to Jeffries (hereinafter Jeffries).

Each of independent claims 1, 12, and 21 has been amended to patentably distinguish over Rao alone, and in combination with Shank and Jeffries.

1. Claim 1

Claim 1 is directed to a storage system for use in a computer system including a host computer. The storage system comprises at least one storage device having a plurality of user-accessible storage locations, a cache memory, and a controller, coupled to the cache memory and the at least one storage device, that controls access to the at least one storage device from the host computer. The at least one storage device includes at least one disk drive, and the controller is capable of generating data that is independent of any data passed from the host computer to the storage system and writing the generated data to at least two non-contiguous user-accessible storage locations on the at least one storage device in response to a communication from the host computer that does not include the generated data to be written to the at least two non-contiguous user-accessible storage locations, without writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations so that any data in the at least one user-accessible storage location is preserved.

In the Response to Arguments section (pages 8-11), the Office Action cited a variety of references discussing both low-level and high-level formatting of disks. Specifically, the Office Action cited Landis as disclosing an ATA Format Track command (a low level formatting command) that recommended a minimum action of writing a binary zero into the data field of each sector formatted. With respect to high level formatting, the Office Action conceded that high level formatting does not "destroy the files" stored on disk. However, on page 10, the Office action asserted that high-level formatting "inherently involved writing file system structures in the user-accessible storage areas."

While not disputing the Office Action's contention that the Landis reference speculates that an ATA Format Track command "probably doesn't do anything other than write some data pattern, maybe binary zeroes, into the data field of every sector on the drive," such a low level format command necessarily operates on the track level. Accordingly, even if the low-level ATA Format Track command does write a data pattern to a disk drive as speculated in Landis, it is incapable of generating data and writing the generated data to at least two non-contiguous user-accessible storage locations on the a storage device without also writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations. Indeed, if a conventional low-level track formatting command were used to format a track that included at least two non-contiguous user-accessible storage locations, then all storage locations between the at least two non-contiguous user-accessible storage locations would also be written with the data pattern. Alternatively, if the at least two non-contiguous user-accessible storage locations were located on different tracks, then only those storage locations on the track being formatted would be written with the data pattern. Accordingly, claim 1 patentably distinguishes over the formatting process of Rao with respect to a low-level format command.

With respect to the Office Action's assertion that a high level formatting command "inherently involved writing file system structures in the user-accessible storage areas," Applicants respectfully disagree. Although the file allocation table and the directory structure can be accessed by the operating system of a computer system to permit access to user-accessible data, neither is used to store user-accessible data. Indeed, the Saucier reference cited in the Office Action highlights the distinction between user-accessible data storage locations that are used to store user-accessible data, and those that store operating and file system control structures, noting that a high-level disk format command "does not destroy the files." Indeed, this is why programs such as "LOST & FOUND and UNFORMAT are able to find files even after the drive has been formatted." Accordingly, because file allocation tables and directory structures are not stored in "user-accessible storage locations, claim 1 also patentably distinguishes over the formatting process of Rao with respect to a high-level format command.

Claims 2-3 and 10 depend either directly or indirectly from claim 1 and patentably distinguish over Rao for at least the same reasons.

2. Claim 12

Claim 12 is directed to a method of operating a storage system in a computer system that includes the storage system and a host computer coupled thereto. The storage system includes a cache memory and at least one storage device having a plurality of user-accessible storage locations, and the at least one storage device includes at least one disk drive. The method comprises, in response to a communication received from the host computer, acts of generating, within the storage system, data that is independent of any data passed from the host computer to the storage system to be written to at least two non-contiguous user-accessible storage locations of the plurality of user-accessible storage locations on the at least one storage device; and writing the generated data to the at least two non-contiguous user-accessible storage locations without writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations so that any data in the at least one user-accessible storage location is preserved.

Claim 12 patentably distinguishes over Rao for reasons similar to those discussed above with respect to claim 1. Specifically, the low-level formatting process described in Rao is incapable of generating data and writing the generated data to at least two non-contiguous user-accessible storage locations without also writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations. Accordingly, claim 12 patentably distinguishes over the formatting process of Rao with respect to a low-level format command. Further, because file allocation tables and directory structures are not stored in "user-accessible storage locations," claim 12 also patentably distinguishes over the formatting process of Rao with respect to a high-level format command.

Claims 13 and 14 depend either directly or indirectly from claim 12 and patentably distinguish over Rao for at least the same reasons.

3. Claims 4-9, 11, 15-20, and 22

With respect to the rejection of claims 4-9, 11, and 15-20 under 35 U.S.C. §103(a) as being unpatentable over Rao further in view of Shank, Applicants note that even if the disclosure of Shank were combined with that of Rao, the resulting combination does not disclose, teach, or suggest Applicants' invention as presently recited in each of independent claims 1 and 12. Specifically, neither reference alone or in combination discloses, teaches, or suggests generating data that is independent of any data passed from a host computer to a storage system and writing that generated data to at least two non-contiguous user-accessible storage locations without writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations as recited in each of these claims. Accordingly, claims 4-9, 11, 15-20, and 22 are believe to be in condition for allowance.

4. Claim 21

Claim 21 is directed to a method of writing information to a logical object of a host computer in a computer system that includes a storage system and the host computer coupled thereto. The storage system includes a cache memory and at least one storage device. The method comprises, in response to a communication received from the host computer, acts of generating, within the storage system, data that is independent of any data passed from the host computer to the storage system to be written to a plurality of storage locations on the at least one storage device corresponding to the logical object of the host computer; and writing the generated data to only the plurality of storage locations corresponding to the logical object.

Rao does not disclose, teach, or suggest a method of writing information to a logical object of a host computer as recited in claim 21. Indeed, nowhere does Rao disclose, teach, or suggest that either a high-level formatting command or a low-level formatting command can be used to generate data and write the generated data to a logical object, such as a file or a database object, of a host computer in the manner recited in claim 21. Although Rao teaches a variety of data conversion and compression/decompression algorithms that may be implemented on his intelligent peripheral controller, in each of these algorithms, the data that is written to the storage locations is not independent of any data passed from the host computer to the storage system as recited in claim 21.

With respect to Shank, although Shank discloses a system that implements virtual disks by using more than one physical disk, Shank says nothing about writing information to a logical object, nor does the Office Action allege that it does. Similarly, although Jeffries discloses scatter and gather operations that may be performed on blocks of data, nowhere does Jeffries disclose, teach, or suggest that the blocks of data correspond to a logical object as recited in claim 21. Accordingly, claim 21 patentably distinguishes over Rao, Shank, and Jeffries alone or in combination.

5. Newly Presented Claims 23-49

Newly presented claims 23-27 depend either directly or indirectly from one of claims 1, 12, and 21 and are believed to be in condition for allowance for at least the same reasons as the independent claims from which they depend.

Newly presented claim 28 is directed to a method of writing information to a logical object of a host computer in a computer system that includes a storage system and a host computer coupled thereto. The storage system includes at least one storage device having a plurality of storage locations. The method comprises acts of mapping the logical object to at least one storage location of the plurality of storage locations on the at least one storage device that is assigned to store the information for the logical object; receiving, at the storage system, a communication from the host computer identifying the at least one storage location; and generating, within the storage system, data that is independent of any data passed from the host computer to the storage system and writing the generated data to the at least one storage location in response to the act of receiving the communication.

None of the cited references, alone or in combination, discloses or suggests a method of writing information to a logical object of a host computer as recited in claim 28. Specifically, although Rao teaches a variety of data conversion and compression/decompression algorithms that may be implemented on his intelligent peripheral controller, in each of these algorithms, the data that is written to the storage locations is not independent of any data passed from the host computer to the storage system as recited in claim 28. None of the other references even address writing information to a logical object. Further, none of the references discloses or suggests an act of mapping a logical object to at least one storage location of a plurality of storage locations on at least one storage device of a storage system that is assigned to store the information for the logical object as recited in claim 28. Accordingly, claim 28 patentably distinguishes over Rao, Shank, and Jeffries alone or in combination.

Claims 29-49 depend either directly or indirectly from claim 28 and are believed to be in condition for allowance.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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MARKED UP CLAIMS

The claims have been amended as follows.

1. (Four Times Amended) A storage system for use in a computer system including a host computer, the storage system comprising:

at least one storage device having a plurality of user-accessible storage locations, the at least one storage device including at least one disk drive;

a cache memory; and

a controller, coupled to the cache memory and the at least one storage device, that controls access to the at least one storage device from the host computer, the controller being capable of generating data that is independent of any data passed from the host computer to the storage system and writing the generated data to [a first] at least two non-contiguous user-accessible storage [location] locations [of the plurality of user-accessible storage locations] on the at least one storage device in response to a communication from the host computer that does not include the generated data to be written to the [first] at least two non-contiguous user-accessible storage [location] locations, without writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations so that any data in the at least one user-accessible storage location is preserved.

2. (Four Times Amended) The storage system of claim 1, [wherein the first user-accessible storage location includes a plurality of first user-accessible storage locations on the at least one storage device, and] wherein the controller is capable of generating the data that is independent of any data passed from the host computer to the storage system and writing the generated data to the [plurality of first] at least two non-contiguous user-accessible storage locations in response to a single command.

3. (Four Times Amended) The storage system of claim 2, wherein the controller is capable of generating the data that is independent of any data passed from the host computer to the storage system having a predetermined state and writing the generated data having the

predetermined state to each of the [plurality of first] at least two non-contiguous user-accessible storage locations in response to the single command.

4. (Thrice Amended) The storage system of claim 2, wherein the at least one storage device includes a plurality of disk drives, wherein the at least two non-contiguous user - accessible storage locations [of the plurality of first user-accessible storage locations] are perceived by the host computer to be non-contiguous storage locations on [the at least one storage device] different disk drives, and wherein the controller is capable of writing the generated data to [any] each of the at least two non-contiguous user-accessible storage locations in response to a single command.

5. (Thrice Amended) The storage system of claim [2]4, [wherein at least two storage locations of the plurality of first storage locations are perceived by the host computer to be storage locations on different storage devices of the at least one storage device, and] wherein the controller is capable of writing the generated data to only each of the at least two non-contiguous user-accessible storage locations in response to [a] the single command.

6. (Thrice Amended) The storage system of claim 2, wherein the at least one storage device includes a plurality of [storage devices] disk drives, wherein the at least two non-contiguous user accessible storage locations [of the plurality of first storage locations] are on different [storage devices] disk drives, and wherein the controller is capable of writing the generated data to each of the at least two non-contiguous user-accessible storage locations in response to [a] the single command.

7. (Amended) The storage system of claim 4, wherein the single command separately identifies the at least two non-contiguous user-accessible storage locations.

8. (Thrice Amended) The storage system of claim 1, wherein the [first] at least two non-contiguous user-accessible storage [location corresponds] locations correspond to a logical object defined by the computer system, [the logical object being formed by a first group of the plurality

of user-accessible storage locations on the at least one storage device that includes the first user-accessible storage location,] and wherein the controller is capable of writing the generated data to each [only the first group] user-accessible storage location corresponding to the logical object in response to the single command.

9. (Twice Amended) The storage system of claim 8, wherein the controller is capable of generating the data that is independent of any data passed from the host computer to the storage system having a predetermined state and writing the generated data having the predetermined state to [the first group] each user-accessible storage location corresponding to the logical object in response to the single command.

11. (Twice Amended) The [A] storage system of claim 1,[for use in a computer system including a host computer, the storage system comprising:

at least one storage device having a plurality of user-accessible storage locations;

a cache memory; and

a controller, coupled to the cache memory and the at least one storage device, that controls access to the at least one storage device from the host computer, the controller being capable of generating data that is independent of any data passed from the host computer to the storage system and writing the generated data to a first storage location of the plurality of storage locations on the at least one storage device in response to a communication from the host computer that does not include the generated data to be written to the first storage location;]

wherein the at least one storage device includes a plurality of disk drives.

12. (Thrice Amended) A method of operating a storage system in a computer system including the storage system and a host computer coupled thereto, wherein the storage system [is a disk drive storage system that] includes a cache memory and at least one storage device having a plurality of user-accessible storage locations, the at least one storage device including at least one disk drive, the method comprising, in response to a communication received from the host computer, acts of:

(A) generating, within the storage system, data that is independent of any data passed from the host computer to the storage system to be written to [a first user-accessible] at least two non-contiguous user-accessible storage locations [storage location] of the plurality of user-accessible storage locations on the at least one storage device; and

(B) writing the generated data to the [first user-accessible] at least two non-contiguous user-accessible storage locations without writing the generated data to at least one user-accessible storage location disposed between the at least two non-contiguous storage locations so that any data in the at least one user-accessible storage location is preserved.

13. (Thrice Amended) The method of claim 12, [wherein the first user-accessible storage location includes a plurality of first user-accessible storage locations on the at least one storage device, and] wherein the act (B) includes an act of writing the generated data to the [plurality of first] at least two non-contiguous user-accessible storage locations in response to a single command received from the host computer.

14. (Thrice Amended) The method of claim 13, wherein the act (A) includes an act of generating the data that is independent of any data passed from the host computer to the storage system having a predetermined state to be written to each of the [plurality of first] at least two non-contiguous user-accessible storage locations in response to the single command received from the host computer.

15. (Thrice Amended) The method of claim 13, wherein the at least one storage device includes a plurality of disk drives, wherein the at least two non-contiguous user-accessible storage locations [of the plurality of first user-accessible storage locations] are perceived by the host computer to be non-contiguous storage locations on [the at least one storage device] different disk drives, and wherein the act (B) includes an act of writing the generated data to [any] each of the at least two non-contiguous user-accessible storage locations in response to the single command received from the host computer.

16. (Thrice Amended) The method of claim [13] 15, [wherein at least two storage locations of the plurality of first user-accessible storage locations are perceived by the host computer to be storage locations on different storage devices of the at least one storage device, and] wherein the act (B) includes an act of writing the generated data to only each of the at least two non-contiguous user-accessible storage locations in response to the single command received from the host computer.

17. (Twice Amended) The method of claim 13, wherein the at least one storage device includes a plurality of [storage devices] disk drives, wherein the at least two non-contiguous user-accessible storage locations [of the plurality of first user-accessible storage locations] are on different [storage devices] disk drives, and wherein the act (B) includes an act of writing the generated data to each of the at least two non-contiguous user-accessible storage locations in response to the single command received from the host computer.

18. (Amended) The method of claim 15, wherein the single command separately identifies the at least two non-contiguous user-accessible storage locations.

19. (Thrice Amended) The method of claim 12, wherein the [first] at least two non-contiguous user-accessible storage [location corresponds] locations correspond to a logical object defined by the computer system, [the logical object being formed by a first group of the plurality of user-accessible storage locations on the at least one storage device that includes the first user-accessible storage location,] and wherein the act (B) includes an act of writing the generated data to [only the first group] each user-accessible storage location corresponding to the logical object in response to a single command received from the host computer.

20. (Twice Amended) The method of claim 19, wherein the act (A) includes an act of generating the data that is independent of any data passed from the host computer to the storage system having a predetermined state to be written to the first group in response to the single command.

21. (Twice Amended) [A method of operating a storage system in] In a computer system including [the] a storage system and a host computer coupled thereto, [wherein] the storage system [includes] including a cache memory and at least one storage device [having a plurality of user-accessible storage locations], a method of writing information to a logical object of the host computer, the method comprising, in response to a communication received from the host computer, acts of:

(A) generating, within the storage system, data that is independent of any data passed from the host computer to the storage system to be written to a [first storage location of the] plurality of storage locations on the at least one storage device corresponding to the logical object of the host computer; and

(B) writing the generated data to [the first storage location] only the plurality of storage locations corresponding to the logical object[;

wherein the storage system is a disc drive storage system, and the at least one storage device includes a plurality of disc drives].

22. (Thrice Amended) The [A] storage system of claim 1, [for use in a computer system including a host computer, the storage system comprising:

at least one storage device including at least one disk drive having a plurality of user-accessible storage locations;

a cache memory; and

a controller, coupled to the cache memory and the at least one storage device that controls access to the at least one storage device from the host computer, the controller being capable of writing data to a first user-accessible storage location of the plurality of user-accessible storage locations on the at least one storage device in response to a communication from the host computer that does not include the data to be written to the first user-accessible storage location,] wherein the controller [including] includes means, responsive to the communication, for generating the data independently of any data passed from the host computer to the storage system.